CLAIMS:

1. A detector for detecting a photon, comprising:

a substrate,

a photon absorber disposed upon said substrate,

a thermoelectric sensor, disposed upon said substrate and thermally coupled with said photon absorber, and

a heat sink disposed upon said substrate, thermally coupled to the thermoelectric sensor,

for absorbing a photon and generating a potential across said sensor, whereby there is a voltage differential between said absorber and said heat sink in response to said photon absorption.

2. A detector for detecting a photon as in claim 1, further comprising means to measure said voltage differential.

3. A detector as in claim 1, wherein said substrate comprises a dielectric material.

4. A detector as in claim 1, wherein responsive to arrival of a photon,

said absorber is heated,

and the heat in said absorber is transferred to said sensor and further transferred to said heat sink.

5. A detector as in claim 4, wherein said heat is transferred from said absorber to said heat sink faster than heat is transferred from said absorber to said substrate.

6. A detector as in claim 5, wherein the time for said heat to be transferred from said absorber to

said heat sink is about ten times less than the time for heat to be transferred from said absorber to said substrate.

7. A detector as in claim 2, wherein said means for measuring said voltage differential comprises superconducting leads.

8. A detector as in claim 7, wherein said superconducting leads are electrically coupled to the input coil of a flux transformer.

9. A detector as in claim 7, wherein said superconducting leads are electrically coupled to the input coil of a flux transformer of a superconducting quantum interference device circuit.

10. A detector as in claim 1, wherein the absorber and the heat sink have the same heat capacity.

11. A detector as in claim 10, wherein the absorber and the heat sink are alike in material and geometry.

12. A detector as in claim 1, wherein said thermoelectric sensor comprises a thin film disposed upon said dielectric substrate.

13. A detector as in claim 1, wherein said thermoelectric sensor comprises a material with isotropic thermoelectric properties.

14. A detector as in claim 12, wherein said thin film comprises gold with impurites.

15. A detector as in claim 12, wherein said thin film comprises gold with iron impurities

between about 10 ppm and 100 ppm.

16. A detector as in claim 12, wherein said thin film comprises a metal with a Seebeck coefficient of at least about 10 μV/K at an operating temperature of said detector.

17. A detector as in claim 12, wherein said thin film comprises a metal with a Seebeck coefficient of between about 10 μV/K and about 80 μV/K at an operating temperature of said detector.

18. A detector as in claim 12, wherein said thin film comprises lanthanum cerium hexaboride.

19. A detector as in claim 1, wherein said photon absorber is selected from the group comprising Be, As, Sb, Bi, Au, Ag, and W.

20. A detector as in claim 19, wherein said photon absorber comprises bismuth.

21. A detector as in claim 1, wherein said heat sink is selected from the group comprising Be, As, Sb, Bi, Au, Ag, and W.

22. A detector as in claim 21, wherein said heat sink comprises bismuth.

23. A detector as in claim 1, further comprising a superconducting element electrically coupled to the heat sink and the photon absorber.

24. A photon detector as in claim 1, wherein said sensor is between said absorber and said heat sink.

25. A photon detector comprising:

a silicon substrate,

a photon absorber comprising bismuth disposed upon said substrate,

said photon absorber having a heat capacity,

a thermoelectric sensor comprising gold with Fe impurities between about 10 and about 100 ppm, disposed upon said substrate and thermally coupled to said photon absorber, and

a heat sink comprising bismuth disposed upon said substrate, thermally coupled to said thermoelectric sensor,

said heat sink having substantially the same heat capacity as the absorber,

for absorbing a photon and generating a potential across said sensor, whereby there is a voltage differential between said absorber and said heat sink in response to said photon absorption.

25. A photon detector comprising

a silicon substrate,

a photon absorber comprising bismuth disposed upon said substrate,

said photon absorber having a heat capacity,

a thermoelectric sensor comprising $(La,Ce)B_6$, disposed upon said substrate and thermally coupled with said photon absorber, and

a heat sink comprising bismuth disposed upon said substrate, thermally coupled to said thermoelectric sensor,

said heat sink having substantially the same heat capacity as the absorber,

for absorbing a photon and generating a potential across said sensor, whereby there is a voltage differential between said absorber and said heat sink in response to said photon absorption.

26. A photon detector comprising:

a silicon substrate,

a photon absorber comprising Sb disposed upon said substrate,

said Sb photon absorber having a width of 18 μm, a length of 22 μm, a thickness of 0.2 μm and a heat capacity C_{abs},

a thermoelectric sensor comprising gold with Fe impurities between about 10 and about 100 ppm,

said thermoelectric sensor having dimensions of 2 μm in width, 26 μm in length, and 0.5 μm in thickness, disposed upon said substrate between said absorber and said heat sink, and thermally coupled with said photon absorber, and

a heat sink comprising Sb disposed upon said substrate, thermally coupled to the thermoelectric sensor,

said Sb heat sink having substantially the same dimensions and heat capacity as the absorber,

for absorbing a photon and generating a potential across said sensor, whereby there is a voltage differential between said absorber and said heat sink in response to said photon absorption.

27. A photon detector as in claim 26, further comprising niobium electric leads attached to said heat sink and to said absorber for measuring said voltage differential.

28. A method for detecting a photon, including:

providing a photon detector comprising

a sensor, a dielectric substrate, a photon absorber disposed upon said substrate, a thermoelectric sensor, disposed upon said substrate and thermally coupled with said photon absorber, and a heat sink disposed upon said substrate, thermally coupled to said thermoelectric

sensor, for absorbing a photon and generating a potential across said sensor, whereby there is a voltage differential between said absorber and said heat sink in response to said photon absorption,

receiving a photon at the absorber, and

measuring the voltage differential.

29. A detector as in claim 1, wherein said sensor has a resistance R which is less than r_0L_0/T^2A_{abs}, where r_0 is the Kapitza resistance constant between the absorber and the substrate, L_0 is the Lorenz number, T is the operating temperature of the detector, and A_{abs}, is the cross sectional area of the absorber.

30. A detector as in claim 29, wherein said r_0 is about 20 K^4cm^2/W and said L_0 is about 25 nW-Ω/K^2.

31. A photon detector comprising:

a thin dielectric wafer having a photon absorber disposed on the edge of said wafer,

a thermoelectric sensor disposed on said wafer, and

a heat sink disposed on said wafer,

wherein said thermoelectric sensor is thermally coupled with said photon absorber, said heat sink is thermally coupled to said thermoelectric sensor,

for absorbing a photon and generating a potential across said sensor, whereby there is a voltage differential between said absorber and said heat sink in response to said photon absorption.

32. A photon detector as in claim 31, wherein

said heat sink and said thermoelectric sensor are disposed on the edge of said wafer.

33. A photon detector as in claim 32, further comprising voltage differential measuring means disposed upon a face of said wafer.

34. A photon detector as in claim 33, wherein said voltage differential measuring means comprises a SQUID array amplifier.

35. A photon detector as in claim 34, said voltage differential measuring means comprises semiconductor electronics.

36. A photon detector array, comprising:

at least one photon detector including

a thin dielectric wafer having a photon absorber disposed on the edge of said wafer,

a thermoelectric sensor disposed on said wafer, and

a heat sink disposed on said wafer,

wherein said thermoelectric sensor is thermally coupled with said photon absorber, said heat sink is thermally coupled to said thermoelectric sensor,

for absorbing a photon and generating a potential across said sensor, whereby there is a voltage differential between said absorber and said heat sink in response to said photon absorption.

37. A photon detector comprising:

a substrate, and

a thermoelectric sensor comprising a thin anisotropic superconducting film, disposed upon the substrate,

for receiving photons and for generating a voltage differential across the sensor in a longitudinal direction which is perpendicular to the plane of the sensor.

38. A photon detector as in claim 37, wherein the Seebeck coefficient of the sensor in one direction is larger than in other directions.

39. A photon detector as in claim 38, wherein the substrate is a viscinally cut dielectric material having a tilt angle less than about 45 degrees between the sensor's a-b plane and longitudinal axis.

40. A photon detector as in claim 39, wherein said substrate comprises a dielectric.

41. A photon detector as in claim 37, wherein said thin anisotropic superconducting film has an effective length L in the longitudinal direction much greater than its thickness.

42. A photon detector as in claim 37, wherein said thin anisotropic superconducting film comprises a oxide-layered superconducting film in normal state.

43. A photon detector as in claim 42, wherein said oxide-layered superconducting film is selected from the group comprising YBaCuO, LaCuO, and LaBaCuO.

44. A photon detector as in claim 42, wherein said oxide-layered superconducting film comprises $La_2CuO_{4+\delta}$.

45. A photon detector as in claim 42, wherein said oxide-layered superconducting film comprises $La_{2-x}Ba_xCuO_4$.

46. A photon detector as in claim 42, wherein said oxide layered superconducting film comprises $YBa_2Cu_3O_7$.

47. A photon detector as in claim 37, further comprising:

an insulating layer disposed upon said sensor and

a normal-metal absorber disposed upon said insulating layer,

said absorber for absorbing incident photons, and

said insulating layer for preventing electrical shorts between portions of said sensor.

48. A photon detector as in claim 47, wherein said normal-metal absorber is tungsten.

49. A photon detector as in claim 37, further comprising a non-electrically conducting absorber disposed upon said insulating layer, said absorber for absorbing photons.

50. A photon detector comprising:

a viscinally cut dielectric substrate having a tilt angle of about 5 degrees,

a thermoelectric sensor comprising a thin oxide superconductor anisotropic film in normal state disposed upon said substrate,

for receiving photons and for generating a voltage differential across the sensor in a longitudinal direction.

51. A photon detector comprising:

a viscinally cut dielectric substrate having a tilt angle of less than about 5 degrees,

a thermoelectric sensor comprising a thin superconducting anisotropic oxide film disposed upon said substrate,

an insulating barrier disposed upon said thin superconducting anisotropic oxide film,

and an absorber for receiving photons,

for receiving photons and for generating a voltage differential across the sensor in a longitudinal direction.

52. A photon detector as in claim 12, wherein said thin film comprises CeNiSn.